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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/600,206	11/13/2000	Graham O'Neill	22749/04002	7913

24024 7590 11/03/2003

CALFEE HALTER & GRISWOLD, LLP
800 SUPERIOR AVENUE
SUITE 1400
CLEVELAND, OH 44114

EXAMINER

MICHALSKI, JUSTIN I

ART UNIT	PAPER NUMBER
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2644

DATE MAILED: 11/03/2003

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

09/600,206

Applicant(s)

O'NEILL ET AL.

Examiner

Justin Michalski

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 11/13/2000.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-39 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-9, 13-39 is/are rejected.
- 7) ☒ Claim(s) 10-12 is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- 11) ☐ The proposed drawing correction filed on _____ is: a) ☐ approved b) ☐ disapproved by the Examiner.
- If approved, corrected drawings are required in reply to this Office action.
- 12) ☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

- 13) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☒ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.
- 14) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).
- a) ☐ The translation of the foreign language provisional application has been received.
- 15) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☒ Information Disclosure Statement(s) (PTO-1449) Paper No(s) 7 and 9.
- 4) ☐ Interview Summary (PTO-413) Paper No(s). _____.
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: _____.

DETAILED ACTION

Claim Rejections - 35 USC § 103

1. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

2. Claims 1-7, 13, and 25-29 are rejected under 35 U.S.C. 103(a) as being unpatentable over Orban (US Patent 5,168,526) in view of Toumazou et al. (Electronic Letters, No. 22, Oct. 27, 1994, pps. 1839-1841). Orban discloses an analog audio signal processor (Figure 1), comprising an input for receiving an audio input signal (input 10), and output for providing a processed audio output signal (output 190), and a tone control circuit coupling the input to the output and comprising first and second filters having different low-pass bands (filters 70 and 80) and a subtractor for subtracting the output currents of the filters to produce a filtered signal (subtractor 180). Orban does not disclose the filters being log-domain or comprising of MOS transistors operating in weak inversion. Toumazou et al. discloses a signal processing circuit (Figure 2) of a log-domain filter employing MOS transistors operating in weak inversion (Column 2, paragraph 2). Toumazou et al. teaches the class of filter having a very high dynamic range, good linearity, and high frequency performance (Column 1, Paragraph 2 through Column 2 Paragraph 1). Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to combine the use of log-

domain filters and MOS transistors with the signal processor to produce a higher dynamic range as taught by Toumazou et al.

Regarding Claim 2, Toumazou et al. further discloses a log converter (i.e. compressor) (Figure 2) coupling the input of a tone control circuit for compressing the dynamic range of the input signal.

Regarding Claim 3, it would have been obvious to one of ordinary skill in the art at the time the invention was made that a voltage-to-current converter would be a possible mode of implementation for the compressor as illustrated by Waldhauer (US Patent 4,882,761) (Column 2, lines 51-56).

Regarding Claim 4, Toumazou et al. further discloses the MOS transistors operating in weak inversion (Column 2, paragraph 2).

Regarding Claim 5, Toumazou et al. further discloses that compressor compresses the dynamic range of the input and amplifies weak signals (i.e. controls sensitivity) (Column 2, paragraph 2).

Regarding Claim 6, it would have been obvious to one of ordinary skill in the art at the time the invention was made that an amplifier could be placed after the tone control circuit for increasing the output to a desired level.

Regarding Claim 7, Toumazou et al. further discloses the input of Figure 2 being a current source (i.e. current signal).

Regarding Claim 13, Orban further discloses only one output (output 180).

Regarding Claim 25, Orban further discloses clipper 20 which controls signal amplitude which passes to subtractor 180.

Regarding Claim 26, it would have been obvious to one of ordinary skill in the art at the time the invention was made that the device could be implemented on a single chip using integrated circuit technology.

Regarding Claim 27, Toumazou et al. further discloses the log-domain filter for use in an electronic cochlea (i.e. aural prosthetic) (Column 1, paragraph 1).

Regarding Claim 28, Toumazou et al. further discloses the log-domain filter for use in an electronic cochlea (i.e. hearing aid) (Column 1, paragraph 1).

Regarding Claim 29, Toumazou et al. further discloses the log-domain filter for use in an electronic cochlea (i.e. cochlear implant) (Column 1, paragraph 1).

3. Claim 8 is rejected under 35 U.S.C. 103(a) as being unpatentable over Orban as modified as applied to claim 1 above, and further in view of Shannon et al. (US Patent 5,549,658). As stated above apropos of claim 1, Orban as modified makes obvious all elements of that claim but does not disclose a biphasic signal generator for supplying a biphasic signal. Shannon et al. discloses a biphasic signal generator (Figure 5, generator 72) for supplying to the output a biphasic signal modulated by the processed audio output signal. Shannon et al. teaches biphasic signals permit signals to be inductively coupled through the skin with reasonable efficiency (Column 15, lines 27-35). Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to use a biphasic signal to efficiently couple an electric signal through the skin.

4. Claim 9 is rejected under 35 U.S.C. 103(a) as being unpatentable over Orban as modified as applied to claim 1 above, and further in view of Shannon et al. (US Patent 5,549,658). Orban as modified discloses a processor as stated in claim 1 but does not disclose full-wave rectification. Shannon discloses the use of full-wave rectifier circuits RECT1-4 and effectively derives the instantaneous envelope of the audio signals in the band. (Column 12, line 65 through Column 13, line 4). Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to include full-wave rectifiers to effectively derive the instantaneous envelope of the audio signal as taught by Shannon.

5. Claims 14-17 are rejected under 35 U.S.C. 103(a) as being unpatentable over Orban as modified as applied to claim 1 above, and further in view of Michelson (US Patent 4,400,590). As stated above apropos of claim 1, Orban as modified makes obvious all elements of that claim and discloses a tone control (Orban, filters 120, and 130) for adjusting the intensity/frequency of the processed audio signal. Orban does not disclose a plurality of outputs. Michelson discloses an audio signal processing circuit (Figure 1) comprising a plurality of outputs (output of drivers 16) for improvement in speech discrimination over a single output (Column 1, line 64 through Column 2, line 6). Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to use a plurality of signals for producing an array of outputs for enhancing the discrimination of an audio signal.

Regarding Claim 15, Michelson further discloses frequency separation means for separating the intensity/frequency adjusted audio signal into a plurality of frequency-separated signals having different frequency bands (Michelson discloses the filters separate the amplified signals into frequency component bands) (Column 3, lines 22-23).

Regarding Claim 16, Michelson further discloses the filters (14) being bandpass filters (Column 5, lines 3-6).

Regarding Claim 17, Toumazou et al. further discloses (Figure 2) the use of log-domain filters comprising of MOS transistors (Column 2, paragraph 2).

6. Claims 18-20 are rejected under 35 U.S.C. 103(a) as being unpatentable over Orban as modified as applied to claim 15 above, and further in view of Shannon et al. (US Patent 5,549,658).

Regarding Claim 18, as stated above apropos of claim 15 Orban as modified makes obvious all elements of that claim. Orban as modified does not disclose biphasic signals. Shannon discloses a plurality of biphasic signal generators (outputs of 71) for supplying biphasic signals modulated by respective ones of the frequency-separated signals (outputs of LM1-4) to respective ones of the outputs. Shannon et al. teaches biphasic signals permit signals to be inductively coupled through the skin with reasonable efficiency (Column 15, lines 27-35). Therefore it would have been obvious to one of ordinary skill in the art at the time the invention was made to use a biphasic signal to efficiently couple an electric signal through the skin.

Regarding Claim 19, Shannon further discloses sampling means for applying samples of the frequency-separated signals to the respective biphase signal generators (Column 14, lines 7-24).

Regarding Claim 20, Shannon further discloses the sampling means comprises a continuous interleaved sample generator (Column 3, lines 42-46).

7. Claims 21-24 are rejected under 35 U.S.C. 103(a) as being unpatentable over Orban as modified as applied to claim 1 above, and further in view of Michelson (US Patent 4,400,590).

Regarding Claim 21, as stated above apropos of claim 1 Orban as modified makes obvious all elements of that claim. Orban as modified does not disclose the intensity/frequency is controllable by a user. Michelson discloses the frequency components (i.e. frequency/intensity) can be shaped to the requirements of the individual user (Column 2, lines 40-43). Therefore, it would have been obvious to one of ordinary skill at the time the invention was made to allow the components to be adjustable in order to customize the output to the individual user.

Regarding Claim 22, Michelson further discloses means for adjusting the treble response and bass response of the electrical signal (Column 6, lines 15-20)

Regarding Claim 23, Michelson further discloses means for adjusting the treble boost and bass boost of the signal (Column 6, lines 15-20).

Regarding Claim 24, Michelson further discloses means for adjusting the level of amplification for each frequency component (i.e. signal amplitude) (Column 5, lines 12-16).

8. Claims 30, 31, 33, 34, and 36 are rejected under 35 U.S.C. 103(a) as being unpatentable over Michelson (US Patent 4,400,590) in view of Toumazou et al. (Electronic Letters, No. 22, Oct. 27, 1994, pps. 1839-1841).

Regarding Claim 30, Michelson discloses a multi-channel analog audio signal processor for use with a cochlear prosthesis (Figure 1), comprising: an input for receiving an audio signal (transducer 10); a plurality of outputs for connection to respective ones of cochlear implant electrodes (output of drivers 16); a plurality of analog signal processing channels coupled to the input, each channel comprising a filter coupled to a respective one of the outputs (Filters 14); and adjustment means for adjusting the intensity/frequency response of each channel (Michelson discloses frequency components can be shaped to the requirements of the user) (Column 2, lines 40-43). Michelson does not disclose the use of log-domain filters or MOS transistors operating in weak inversion. Toumazou et al. discloses a signal processing circuit (Figure 2) of a log-domain filter employing MOS transistors operating in weak inversion. Toumazou et al. teaches the class of filter having a very high dynamic range, good linearity, and high frequency performance (Column 1, Paragraph 2 through Column 2 Paragraph 1). Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to combine the use of log-domain filters and MOS

transistors with the signal processor to produce a higher dynamic range as taught by Toumazou et al.

Regarding Claim 31, Michelson further discloses each channel comprising an amplifier (driver 15) having controllable gain (Column 5, lines 12-16).

Regarding Claim 33, Michelson further discloses a tone generator (filters 14 and drivers 16) for generating tones of preset amplitude and frequency dependent on the fundamental frequencies of the filters (filter 14) of the channels.

Regarding Claim 34, Michelson further discloses tone generator control means for selecting the frequency of the tone produced by the tone generator (frequency components can be shaped to the requirements of the user (i.e. frequency can be selected)) (Column 2, lines 40-43).

Regarding Claim 36, Michelson further discloses separate filters (14) and drivers (16) that can independently adjusted by channel.

9. Claim 35 rejected under 35 U.S.C. 103(a) as being unpatentable over Michelson as modified as applied to claim 34 above, and further in view of Müller. Michelson as modified discloses a processor as stated apropos of claim 34 but does not disclose control transmitted by a wireless remote control. Müller et al. discloses an implantable device whose audiological functions can be transcutaneously controlled by remote control to adapt to ambient acoustic conditions (Column 11, lines 25-41). Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was

made to use a remote control to change operating parameters for adapting to ambient acoustical conditions resulting in a higher quality audio signal.

10. Claim 32 is rejected under 35 U.S.C. 103(a) as being unpatentable over Michelson as modified as applied to claim 30 above, and further in view of Müller et al. (US Patent 5,814,095). Michelson as modified discloses a processor as stated apropos of claim 32 but does not disclose use adjustments transmitted by a wireless remote control. Müller et al. discloses an implantable device whose audiological functions can be transcutaneously controlled by remote control to adapt to ambient acoustic conditions (Column 11, lines 25-41). Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to use a remote control to change operating parameters for adapting to ambient acoustical conditions resulting in a higher quality audio signal.

11. Claims 37 and 38 are rejected under 35 U.S.C. 103(a) as being unpatentable over Michelson as modified as applied to claim 30 above, and further in view of Zierhofer (US Patent 5,983,139).

Regarding Claim 37, Michelson as modified discloses a processor as stated in claim 30 but does not disclose sampling means coupling the channels to the outputs. Zierhofer discloses continuous interleaved sampling successfully achieved high levels of speech recognition (Column 1, lines 13-16). Therefore, it would have been obvious

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to one of ordinary skill at the time the invention was made to implement sampling to create a high level of speech recognition.

Regarding Claim 38, Zierhofer further discloses the sampling means comprises a continuous interleaved sample generator (Column 1, lines 13-16).

12. Claim 39 is rejected under 35 U.S.C. 103(a) as being unpatentable over Michelson as modified as applied to claim 30 above, and further in view of Shannon (US Patent 5,549,658). Michelson as modified discloses a processor as stated in claim 30 but does not disclose the use of biphasic generators. Shannon discloses sampling means for applying samples of the frequency-separated signals to the respective biphasic signal generators (Column 14, lines 7-24). Shannon et al. teaches biphasic signals permit signals to be inductively coupled through the skin with reasonable efficiency (Column 15, lines 27-35). Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to use a biphasic signal to efficiently couple an electric signal through the skin.

Allowable Subject Matter

13. Claims 10-12 would be allowable if rewritten to overcome the rejection(s) under 35 U.S.C. 112, second paragraph, set forth in this Office action and to include all of the limitations of the base claim and any intervening claims.

Conclusion

14. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Justin Michalski whose telephone number is (703)305-5598. The examiner can normally be reached on 8 Hours, 5 day/week.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Bill Isen can be reached on (703)305-4386. The fax phone number for the organization where this application or proceeding is assigned is (703) 872-9306.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is (703)305-3900.

JIM


XU MEI
PRIMARY EXAMINER